

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 23 JUN 2005

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Applicant's or agent's file reference TS 6437 PCT		<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2004/051364		International filing date (day/month/year) 06.07.2004	Priority date (day/month/year) 07.07.2003	
International Patent Classification (IPC) or national classification and IPC E21B43/10				
Applicant SHELL INTERNATIONAL RESEARCH MAATSCHAPPIJ BV et al				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand  28.04.2005		Date of completion of this report  21.06.2005		
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Stroemmen, H.  Telephone No. +49 89 2399-7345		



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/051364

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-6, 8-12	as originally filed
7	received on 12.05.2005 with letter of 12.05.2005

**Claims, Numbers**

6-13	as originally filed
1-5	received on 12.05.2005 with letter of 12.05.2005

**Drawings, Sheets**

1/6-6/6	as originally filed
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☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

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1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 13

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 13 are so unclear that no meaningful opinion could be formed (*specify*):

**see separate sheet**

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos.

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form ☐ has not been furnished

☐ does not comply with the standard

the computer readable form ☐ has not been furnished

☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☐ See separate sheet for further details

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-12
	No: Claims	
Inventive step (IS)	Yes: Claims	1-12
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-12
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**Re Item III**

**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

- III-1      Claim 13 does not specify explicitly and univocally any technical feature, and can therefore not be examined. Furthermore, said claim contain references to the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

- V-1      The document D1 (US-A-6 070 671) is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A method of expanding a tubular element having a first portion to be expanded to a first inner diameter and a second portion to be expanded to a second inner diameter larger than the first inner diameter (col. 2, l. 37-55). the method comprising:

The subject-matter of claim 1 differs from this known method in the following further steps:

- a)    arranging an expandable sleeve of selected wall thickness in said second tubular element portion;
- b)    positioning an expander in the tubular element;
- c)    operating the expander so as to expand said first tubular element portion to the first inner diameter, and operating the expander so as to expand the sleeve to an inner diameter substantially equal to the second inner diameter minus double the wall thickness of the sleeve; and
- d)    retrieving the sleeve from the tubular element.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

V-2      The solution to the problem of how to further improve the expansion method is not considered obvious in light of the cited prior art. Claim 1 involves therefore also an inventive step (Article 33(3) PCT).

V-3      Claims 2-11 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

**Re Item VII**

**Certain defects in the international application**

VII-1      The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

VII-2      Claim 13 contains a reference to the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

VII-3      Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

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C L A I M S

1. A method of expanding a tubular element having a first portion to be expanded to a first inner diameter and a second portion to be expanded to a second inner diameter larger than the first inner diameter,

5 characterized in that the method comprises:

a) arranging an expandable sleeve of selected wall thickness in said second tubular element portion;

b) positioning an expander in the tubular element;

c) operating the expander so as to expand said first

10 tubular element portion to the first inner diameter, and operating the expander so as to expand the sleeve to an inner diameter substantially equal to the second inner diameter minus double the wall thickness of the sleeve; and

15 d) retrieving the sleeve from the tubular element.

2. The method of claim 1, wherein the sleeve and the first tubular element portion are expanded to substantially the same inner diameter.

3. The method of claim 1 or 2, wherein the tubular  
20 element extends into a wellbore formed in an earth formation, and wherein said second portion is an end portion of the tubular element.

4. The method of any one of claims 1-3, wherein the sleeve is provided with a plurality of openings defining  
25 a pattern of a plurality of members subjected to bending upon radial expansion of the sleeve.

5. The method of claim 4, wherein each said member includes a hinge section in which bending of the member is concentrated.

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In Figure 6, the expander 1 is located further (55) upwardly from the bell portion 38 whereby the sleeve 36, the bell portion 38 and a further part of the remainder casing portion 41 have been radially expanded.

5 Referring to Figure 7A there is shown a retrieval tool 46 suspended from surface on a running string 48 extending into the casing 32. The retrieval tool 46 is provided with a number of radially extending spring-loaded pins 50  
10 biased into corresponding openings 52 formed in the wall of the sleeve 36 so as to latch the retrieval tool 46 to the sleeve 36.

Referring to Figure 7B there is shown the retrieval tool 46 latched to the sleeve 36 whereby the sleeve has been pulled upwardly a short distance through the  
15 casing 32.

During normal operation, the casing 32 is lowered into the wellbore 34 whereby the sleeve 34 and the expander 1 are arranged relative the casing 32 in the position shown in Fig. 2 whereby a moderate pulling force  
20 is exerted from surface to the expander 1 via conduit 26. Subsequently the casing 32 is radially expanded in a plurality of expansion cycles whereby each cycle includes a first stage and a second stage, as explained below.

In the first stage of the expansion cycle the fluid  
25 control system is operated to pump pressurised fluid, for example drilling fluid, via the conduit 26 into the fluid chamber 23 of the bladder 16. As a result the bladder 16 is inflated and thereby exerts a radially outward pressure against the body segments 10 which thereby  
30 become elastically deformed by radially outward bending.

The volume of fluid pumped into the bladder 16 is selected such that any deformation of the body segment 10 remains within the elastic domain.